

AMENDMENTS TO THE CLAIMS

Kindly amend claim **12** and add new claim **36** as shown in the listing of claims below. This listing of claims will replace all prior versions, and listings of claims in the application.

- 1 1-11. (canceled)
- 1 12. (currently amended) An inorganic/organic nanolaminate barrier film, comprising:
2 a plurality of layers of an inorganic material; and
3 a plurality of layers each consisting of an organic polymer wherein the layers of organic
4 polymer alternate with the layers of inorganic material;
5 wherein adjacent layers of the organic polymer and the inorganic material are covalently
6 bonded layers characterized by direct organic polymer-inorganic material covalent
7 bonds~~[that couple adjacent layers together]~~.
- 1 13. (previously presented) The barrier film of claim 12 wherein the total number of layers of
2 organic polymer and layers of inorganic material in the film is between about 100 and
3 about 1000 layers, or between about 1000 and about 10,000 layers, or between about
4 10,000 layers and about 100,000 layers.
- 1 14. (original) The barrier film of claim 12 wherein each of the layers of inorganic material has a
2 thickness of about 0.1 nm to about 1 nm; about 1 to about 10 nm; or about 1 nm to about
3 100 nm.
- 1 15. (original) The barrier film of claim 14 wherein the barrier film is substantially transparent.
- 1 16. (original) The barrier film of claim 12 wherein the barrier film has a permeability to oxygen
2 less than about 1 cc/m²/day, 0.1 cc/m²/day, 0.01 cc/m²/day, 10⁻³ cc/m²/day, 10⁻⁴
3 cc/m²/day, 10⁻⁵ cc/m²/day, or 10⁻⁶ cc/m²/day.
- 1 17. (original) The barrier film of claim 16 wherein the barrier film has a permeability to water
2 vapor less than about 1 g/m²/day, 0.1 g/m²/day, 0.01 g/m²/day, 10⁻³ g/m²/day, 10⁻⁴
3 g/m²/day, 10⁻⁵ g/m²/day, or 10⁻⁶ g/m²/day.
- 1 18. (previously presented) The barrier film of claim 12 wherein one or more of the layers of
2 organic polymer is a superhydrophobic layer.

- 1 19. (original) The barrier film of claim 18 wherein the superhydrophobic layer includes
2 fluororalkylsilane.
- 1 20. (previously presented) The barrier film of claim 12 wherein the layers of organic polymer are
2 made from polymer precursors to which one or more one or more hydrophobic groups
3 have been added.
- 1 21. (original) The barrier film of claim 20 wherein the one or more hydrophobic groups are
2 selected from the group of non-polar hydrophobic groups, methyl groups, benzyl
3 (aromatic) groups, PO_4^{3-} , SO_4^{2-} , CH_3COO^- , Cl^- , Br^- , NO^- , ClO_4^- , I^- , SC_n^- anions, NH_4^+ ,
4 Rb^+ , K^+ , Na^+ , Cs^+ , Li^+ , Mg^{2+} , Ca^{2+} , Ba^{2+} cations, tryptophan, isoleucine, phenylalanine,
5 tyrosine, leucine, valine, methionine, and alanine.
- 1 22. (original) The barrier film of claim 12 wherein the barrier film is made from a sol including
2 one or more Gemini surfactants.
- 1 23. (original) An article of manufacture, comprising:
2 an object having a surface; and
3 an inorganic/organic hybrid nanolaminate barrier film of the type set forth in claim 12
4 disposed on the surface.
- 1 24. (original) The article of manufacture of claim 23 wherein the object is selected from the
2 group of optoelectronic devices, LEDs, solar cells, FETs, lasers, pharmaceutical products,
3 tablets in packages, medical devices, food products, packaged foods, beverages, candies,
4 display screens, touch panel displays, flat panel displays, electroluminescent windows,
5 windows, transparent films and coatings, electronic components, and chassis for appliances
6 used in rugged environments.
- 1 25. (previously presented) The barrier film of claim 12 wherein one or more of the layers of
2 organic polymer and/or inorganic material are in the form of lamellae.
- 1 26. (previously presented) The barrier film of claim 12 wherein one or more of the layers of
2 organic polymer and/or inorganic material are in the form of tubules.
- 1 27. (previously presented) The barrier film of claim 12 wherein the organic polymer is chosen
2 from the group of polyethylene naphthalate, polyether etherketone, polyether sulfone,

3 polymers formed from fluorinated or non-fluorinated styrene polymer precursors, fluorinated
4 or non-fluorinated methyl styrene polymer precursors, fluorinated or non-fluorinated
5 (meth)acrylate polymer precursors, and combinations and/or derivatives of two or more of
6 these precursors.

1 28. (previously presented) The barrier film of claim 12 wherein adjacent layers of the organic
2 polymer and inorganic material are covalently bonded to each other at an interface between
3 organic and inorganic materials.

1 29. (previously presented) The barrier film of claim 12 wherein the layers of the organic polymer
2 are discrete layers of organic polymer and wherein the layers of inorganic material are
3 discrete layers of inorganic material.

1 30. (previously presented) The barrier film of claim 12 wherein alternating layers of organic
2 polymer and inorganic material present a long and tortuous penetration path through the
3 barrier film to an underlying substrate.

1 31. (previously presented) The barrier film of claim 12 wherein layers of the inorganic material
2 are self-assembled layers of inorganic material.

1 32. (previously presented) The barrier film of claim 12 wherein layers of the organic polymer are
2 self-assembled layers of organic polymer.

1 33. (previously presented) The barrier film of claim 12 wherein at least one coating of material
2 self-assembles into the alternating plurality of layers of inorganic material and plurality of
3 layers of organic polymer.

1 34. (previously presented) The barrier film of claim 12 wherein layers consisting of the organic
2 polymer and layers of the inorganic material have different material compositions.

1 35. (previously presented) The barrier film of claim 12 wherein the layers of inorganic material
2 are layers consisting of the inorganic material.

1 36. (new) An inorganic/organic nanolaminate barrier film, comprising:
2 a plurality of layers of an inorganic material; and
3 a plurality of layers each consisting of an organic polymer wherein the layers of organic

4 polymer alternate with the layers of inorganic material;
5 wherein adjacent layers of the organic polymer and the inorganic material are covalently
6 bonded layers characterized by direct organic polymer-inorganic material covalent bonds
7 between adjacent layers.